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ELECTROENCEPHALOGRAPHIC STUDY OF PILOT STRESSES IN FLIGHT

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ELECTROENCEPHALOGRAPHIC STUDY OF PILOT STRESSES IN FLIGHT.

The selection and classification by airborne electroencephalography of pilots in high performance aircrafts have been carried out. The findings were published In Journal of Aviation Medicine, November 1959.

To ascertain the significance of these findings forty more missions have been flown adding flight pattern recording, ECG and inflight movie to the examination. Film-strips of the pilots' reaction were made at the time of a stressful turn and five minutes later, during bomb-runs at a target range. This is a standard NATO manoevre for the F-86. EEG, ECG and flight patterns recording was made from take-off to landing; movies for technical reasons only for brief periods.

There had been no question about the fitness of the pilots. The pilots rated as A, with only minimal changes in the airborne EEG test, appeared unaffected on the movie. The B-group has short episodes of high voltage delta-theta-activity in the EEG. The movie revealed an eight seconds convulsion. The pilots in the C category showed major EEG abnormalities. The movie revealed them unconscious for thirty seconds.

During the study more than 100 subjects were tested. The study underlines the value of airborne EEG testing as an objective method to evaluate the pilots' ability to act and react when subjected to flight stress and fatigue in the high performance aircrafts and space vehicles. An unknown number of pilots have convulsions during "black-outs" and brain anoxia, as a secondary response in spite of good O_2 supply.

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Airborne EEG has been made in a group of Norwegian Air Force pilots. A total of more than 100 subjects have been tested. After preliminary studies (1), good recordings were obtained. The findings were substantiated and verified by movie pictures. The first results were reported at the Congress of Aerospace Medicine (2) and at the annual meeting of the Aerospace Medical Association (3). The paper was accepted for publication together with results of the work carried out through October 1959 (4), (see enclosed reprint).

The problems were also presented at the Space Symposium in Washington in 1958 (5).

Technical difficulties in obtaining the right equipment made it neccesary for the contractor after considerable delay, to make his own equipment. Contract Nr. AF 61 (052)-425. The dedicated personnel at the contractors own laboratory in Oslo rendered valuable support. The Royal Norwegian Air Force helped out in providing planes, pilots and related service. An unfortunate disaster occured on January 15, 1960 when the Norwegian test plane DPS disappeared at sea and ltn. Ludvig Moksness and ltn. Magne Sagmoen were killed. After November 1959 no more money was available under this contract. For technical reasons and to fascilitate the work the contract was prolonged for another year, but after December 1, 1959 the work was continued under WADD contract Nr. 6702.

It has been demonstrated that with proper equipment and technique it is possible to make EEG recordings of pilots while flying simulated combat missions in high performance aircrafts. It is feasible to take EEG, ECG recordings and 8 mm movies of the pilots to substantiate the findings.

The results of such studies demonstrate the mismatching in some instances between the pilots' capability to act or react under stress and the requirement put on them. The results of the airborne study as published (4), (see enclosed reprint) were substantiated at Wright Field during the summer of 1960. This work was however carried out under Contract Nr. AF 33 /616-6702 and is discribed in the final report dealing with this contract.

The research carried out, demonstrates and substantiates the need for airborne testing of jet fighter pilots and shows how a small group probably 20% of the active fighter pilots have a lower treshhold for stress and thus are less capable to handle high performance aircrafts during stressful manoevres, such as combat missions. The results indicate that these 20% of the pilot population experience episodes with unconsciousness and sometimes convulsions while flying and further that these pilots are responsible for an unproportional high number of aircraft accidents due to pilot errors. This knowledge may substantially help to increase flight safety and the effectiveness of the jef fighters in combat.
For further details see enclosed reprints 1-3-4-6.

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